Endogenously EGFP-Labeled Mouse Embryonic Stem Cells.

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Public Summary:
Mice were produced in whom cells contain a green protein that allows them to be traced after they are transplanted. This allows the survival of transplanted cells to be monitored, by counting the number of green cells in a tissue section. This provides a useful tool for determining the efficacy of different transplantation protocols for replacing cells that are lost in injury or disease.

Scientific Abstract:
Transplantation of embryonic stem cell (ESC)-derived precursors holds great promise for treating various disease conditions. Tracing of precursors derived from ESC after transplantation is important to determine their migration and fate. Chemical labeling, as well as transfection or viral-mediated transduction of tracer genes in ESC or in ESC-derived precursors, which are the methods that have been used in the generation of the vast majority of labeled ESCs, have serious drawbacks such as varying efficacy. To circumvent this problem we generated endogenously traceable mouse (m)ESC clones by direct derivation from blastocysts of transgenic mice expressing enhanced green fluorescent protein (EGFP) under control of the housekeeping beta-actin promoter The only previous report of endogenously EGFP-labeled mESC derived directly from transgenic EGFP embryos is that of Ahn and colleagues (Ahn et al, 2008. Cytotherapy 10:759-769), who used embryos from a different transgenic line and used a significantly different protocol for derivation. Cells from a high-expressing EGFP-mESC clone, G11, retain high levels of EGFP expression after differentiation into derivatives of all three primary germ layers both in vitro and in vivo, and contribution to all tissues in chimeric progeny. To determine whether progenitor cells derived from G11 could be used in transplantation experiments, we differentiated them to early neuronal precursors and injected them into syngeneic mouse brains. Transplanted EGFP-expressing cells at different stages of differentiation along the neuronal lineage could be identified in brains by expression of EGFP twelve weeks after transplantation. Our results suggest that the EGFP-mESC(G11) line may constitute a useful tool in ESC-based cell and tissue replacement studies.